CLAIMS

What is claimed is:

1.   A method for monitoring the delivery of workpieces to a

position comprising the steps of:

storing a digital reference image of the position prior to

the delivery of workpieces;

storing a digital operating image of the position during

delivery of workpieces;

performing image arithmetic on the reference image and the

operating image to produce a digital evaluation image comprised

of a plurality of pixels;

establishing a threshold image condition for the evaluation

image that correlates to the existence of an operating condition

relevant to the control of the delivery of workpieces;

examining the pixels in the evaluation image to determine

whether the threshold image condition is met.

2.   The method of claim 1, wherein the step of performing image

arithmetic comprises the step of producing a difference image.

- 17 -

3. The method of claim 1, wherein the step of performing image arithmetic comprises the step of producing an unsigned difference image.

4. The method of claim 1, wherein the step of storing a digital reference image comprises the step of storing a plurality of different digital reference images corresponding to different environmental conditions and the step of performing image arithmetic comprises the selection of the digital reference image that is expected to correspond most closely to the operating image.

5. The method of claim 4, wherein different reference images are stored at different times of day and wherein the step of performing image arithmetic comprises selecting the reference image corresponding to the time of day when the operating image was stored.

6. The method of claim 1, further comprising the step of controlling the ambient light condition in the vicinity of the position.

7. The method of claim 1 wherein the threshold image condition comprises a pixel value threshold and the step of examining the

pixels in the evaluation image to determine whether the threshold image condition is met comprises the step of assigning a value to a pixel in the evaluation image based upon the brightness of the pixel.

8. The method of claim 1 wherein the threshold image condition comprises a pixel value threshold and the step of examining the pixels in the evaluation image to determine whether the threshold image condition is met comprises the step of assigning a value to a pixel in the evaluation image based upon the brightness of the pixel and the brightness of at least one adjacent pixel.

9. The method of claim 1, further comprising the step of checking a camera position reference.

10. The method of claim 9, wherein the step of checking a camera position reference comprises the step of examining a portion of the evaluation image that corresponds to a portion of the reference image that contains a camera position target.

- 19 -

11. A method for controlling the flow of packages in a package handling system, the method comprising the steps of:

activating a lane to receive packages from a package source and commencing a timer for the active lane;

monitoring the fill status of at least the active lane;

deactivating the active lane when the timer reaches a predetermined limit or when the fill status reaches a predetermined limit.

12. The method of claim 11, further comprising the step of continuously monitoring the fill status of all of the lanes.

13. The method of claim 12, further comprising the step of checking the fill status of a lane prior to activating it.

14. The method of claim 11, wherein the step of monitoring the fill status of at least the active lane comprises the steps of:

storing a digital reference image of the lanes in an empty state;

storing a digital operating image of the active lanes;

defining a fill status condition;

comparing the operating image of the active lane to a reference image to determine if the fill status condition is met.

15. The method of claim 14, wherein the step of defining a fill status condition comprises the step of defining at least 2 fill status conditions.

16. The method of claim 15, wherein the fill conditions are at least about 75% full and about 100% full.

17. The method of claim 14, further comprising the step of checking a camera position reference.

18. The method of claim 14, wherein

the step of storing a digital reference image comprises the step of obtaining a plurality of digital reference images at different times of day; and

the step of comparing each operating image to the reference image comprises the step of selecting the reference image obtained at a time of day close to the time of day that the operating image was obtained.

19. A method for controlling the delivery of packages from a
package source to a plurality of lanes on a slide comprising the
steps of:

storing a digital reference image of at least a portion of
the lanes prior to the delivery of packages;

storing a digital operating image of at least a portion of
the lanes during delivery of workpieces;

performing image arithmetic on the reference image and the
operating image to produce a digital evaluation image comprised
of a plurality of pixels;

establishing a threshold image condition for the evaluation
image that correlates to whether a specified capacity of the
lane has been exceeded;

examining the pixels in the evaluation image to determine
whether the threshold image condition is met; and

generating a signal corresponding to whether the threshold
image condition is met.

20. The method of claim 19, wherein the step of performing
image arithmetic comprises the step of producing a difference
image.

21. The method of claim 19, wherein the step of performing image arithmetic comprises the step of producing an unsigned difference image.

22. The method of claim 19, wherein the step of storing a digital reference image comprises the step of storing a plurality of different digital reference images corresponding to different environmental conditions and the step of performing image arithmetic comprises the selection of the digital reference image that is expected to correspond most closely to the operating image.

23. The method of claim 22, wherein different reference images are stored at different times of day and wherein the step of performing image arithmetic comprises selecting the reference image corresponding to the time of day when the operating image was stored.

24. The method of claim 19, further comprising the step of controlling the ambient light condition in the vicinity of the lanes.

25. The method of claim 19 wherein the threshold image condition comprises a pixel value threshold and the step of

- 23 -

examining the pixels in the evaluation image to determine whether the threshold image condition is met comprises the step of assigning a value to a pixel in the evaluation image based upon the brightness of the pixel.

26.   The method of claim 19 wherein the threshold image condition comprises a pixel value threshold and the step of examining the pixels in the evaluation image to determine whether the threshold image condition is met comprises the step of assigning a value to a pixel in the evaluation image based upon the brightness of the pixel and the brightness of at least one adjacent pixel.

27.   The method of claim 19, further comprising the step of checking a camera position reference.

28.   The method of claim 27, wherein the step of checking a camera position reference comprises the step of examining a portion of the evaluation image that corresponds to a portion of the reference image that contains a camera position target.

29.   The method of claim 19, wherein the step of establishing a threshold image condition comprises the step of establishing a plurality of threshold image conditions.

- 24 -

30. A system for monitoring the flow of packages from a package
source to a lane comprising the steps of:

means for storing a digital reference image of at least a
portion of the lanes prior to the delivery of packages;

means for storing a digital operating image of at least a
portion of the lanes during delivery of workpieces;

means for performing image arithmetic on the reference
image and the operating image to produce a digital evaluation
image comprised of a plurality of pixels;

means for storing a threshold image condition for the
evaluation image that correlates to whether a specified capacity
of the lane has been exceeded;

means for examining the pixels in the evaluation image to
determine whether the threshold image condition is met.

31. The system of claim 30, further comprising means for
controlling changes in the ambient light condition in the
vicinity of the lanes.

32. The system of claim 30 wherein the means for examining the
pixels in the evaluation image comprises means for assigning a
value to a pixel in the evaluation image based upon the
brightness of the pixel.

33. The system of claim 30 wherein the means for examining the pixels in the evaluation image comprises means for assigning a value to a pixel in the evaluation image based upon the brightness of the pixel and the brightness of at least one adjacent pixel.

34. The system of claim 30, further comprising means for checking a camera position reference.

35. The system of claim 34, wherein means for checking a camera position reference comprises means for examining a portion of the evaluation image that corresponds to a portion of the reference image that contains a camera position target.

36. A system for controlling the flow of packages from a conveyor to a lane, comprising:

means for activating and deactivating a lane to receive packages from the conveyor, wherein the lane activating and deactivating means comprises a timer;

means for monitoring the presence of packages on a lane.

37. The system of claim 36, wherein the means for monitoring the fill status of the lanes comprises at least one camera.

38. The system of claim 37, wherein the means for activating and deactivating a lane comprises a memory for storing a plurality of images.

39. The system of claim 38, wherein the means for activating and deactivating a lane comprises means for comparing images and for generating a signal when the result of comparing two images satisfies a predetermined condition.

40. The system of claim 36, further comprising means for displaying the fill status of at least an active lane.

41. The method of claim 36, further comprising the step of displaying the fill status of all of the lanes.

42. The system of claim 37, further comprising means for checking the position of the camera.

43. The system of claim 42, further comprising means for generating an error message if the camera is not in a desired position.